7 Yearly Compliance Assessment

The Yearly Compliance Assessment (Self Assessment) section of the program uses the facility information stored in the design capacity, NPDES permit limits, and the monthly discharge monitoring records, to evaluate the performance of the facility with respect to compliance with the discharge permit. The ISAP data files are organized so that multiple years of monitoring data, and various versions of the facility design and NPDES permit limits can be stored. This allows the user to prepare a variety of current and/or historical assessments for comparison purposes.

The compliance section will automatically detect permit limit violations by type, frequency, and severity, and provide a summary for the period of time specified. The self assessment section of the program is performed on a calendar year basis and determines a score based on comparing the measured monthly monitoring data against the NPDES permit limits and plant design capacity data. While no scoring system will account for every situation, it does provide a simple measure a wastewater treatment facility manager can use to evaluate progress from year to year, and compare performance to other treatment plants.

The self assessment scoring selected for this computer program is:

Score = [(# violations of 85% of permit limit) x 2] + [(# of permit violations) x 5] +

[(# of technical review criteria violations) x 10]

where # is the number of monthly violations in a calendar year.

A **technical review criteria (TRC) violation** indicates a significant violation of the permit limit. For the self assessment program a TRC violation occurs when the permit limit is exceeded by 1.4 times the limit for $CBOD_5$ and TSS, and 1.2 times the limit for total residual chlorine, ammonia nitrogen, and metals. There are no TRC violation factors for flow rate, pH, and fecal coliform.

A **violation of 85% of the permit limit** is counted if the monthly monitoring data exceeds 85% of the permit limit for a specific parameter (i.e. the $CBOD_5$ monthly average concentration limit is 25 mg/L and the measured monthly average value exceeds 21.2 mg/L). For pH the 85% limit is based on the range between the upper and lower limit;for pH limits of 6 and 9, a range of 3, 1/2 of 15% of 3 is applied to the upper and lower limit, resulting in 85% limit violations if the pH is between 6.0 and 6.2 or between 8.8 and 9.0.

A **limit violation** is counted whenever the permit limit or design capacity is exceeded.

The violations are counted in each permit limit category exceeded, that is a violation of the permitted limit counts as both one violation of the permitted limit (5 points) and one violation of exceeding 85% of the permitted limit (2 points), for a total of 7 points. As an example, assume the permitted limit for monthly average effluent $CBOD_5$ is 20 mg/L. The measured monthly average effluent $CBOD_5$ concentrations are entered for

each month of the calendar year. If a monthly monitoring $CBOD_5$ average (MA) exceeds the permitted limit (i.e. MA $CBOD_5$ = 25 mg/L), this will count as 1 permit limit violation and as 1 violation of 85% of the permit limit. The violation receives a total of 7 points (2 points for 85% of limit violation and 5 points for the permit violation). If the measured MA $CBOD_5$ = 30 mg/L, the MA exceeds the permit limit by a factor of 1.5, the violation causes 17 points to be added to the score (10 points for a TRC violation, 5 points for a permit violation, and 2 points for exceeding 85% of the permit limit). If the monthly measured data value (MA, MM, 7M) is less than 85% of the permitted limit, there are no added points or violations.
The total score is the summed score for each permit limit and design capacity limit for each month of the calendar year.

During the development of the ISAP the self assessment program was applied to all 81 of Iowa's major (Q > 1.0 MGD) wastewater treatment facilities using the actual NPDES monitoring data for 5 calendar years, 1990 - 1994. This was done to evaluate the scoring system and provide some perspective on the relative meaning of a particular score for the annual self assessment. Using the self assessment scoring system described previously, the self assessment score was determined for each major facility for 1990 - 1994. Evaluation of this information, resulted in the use of a simple three (3) color system for categorizing the scores. The three color ratings are:

Score	Color
< 100 points	Green
100 to 300 points	Yellow
> 300 points	Red

A score of 100 points or less is rated as green, and indicates the wastewater treatment is generally doing a good job at meeting permit criteria and there is probably not a concern with excessive pollution problems in the near future. A score of 100 to 300 points is receives a yellow rating. The yellow rating indicates there is currently a higher frequency and severity of compliance problems with the possibility of increased levels of pollution in the receiving stream. A yellow rating should prompt increased attention to facility process modifications and O&M troubleshooting to improve future plant performance. A score of more than 300 points is assigned a red rating. A red rating means there are currently significant problems with the frequency and severity of permit limit compliance violations. Plant improvements and process upgrading are probably required to reduce current and future pollution problems.

Determining the Self Assessment Score

From the main menu, click the "Yearly Compliance Assessment" option and the compliance assessment application window will be displayed. The first step in running the compliance assessment is to enter the "Year" in the data cell and press the <Enter> key to perform the calculation. When the assessment is complete, the yearly compliance assessment summary table will appear in the application window. The table shows the parameter limits and measured values in adjacent columns for each month of the year. The number and type of monthly violations are summarized at the bottom of each column for each measured parameter. The total number of

violations, for each category of violation (85% permit limit, permit limit, and TRC), for all the selected parameters, is computed and displayed at the top of the application window in the respective boxes. The total self assessment score is computed and displayed in the upper right corner of the application window.

The user is reminded at this point that the point score will be computed based on the design and permit parameters entered earlier in the program setup. Only those parameters selected in the design capacity and permit parameter files will be displayed in the self assessment summary table. A special effort should be made to ensure the correct permit limits and design capacity are used for the year selected for the self assessment computation.

A copy of the self assessment report can be printed by clicking the "Print" option button. The user will be prompted to select from two options: (1) a summary report only, and (2) discharge monitoring records with limits. A sample summary report is shown in Appendix A, pages A-1 through A-7. An example of the discharge monitoring records with limits is shown on pages A-10 through A-15.

A graphical ranking of the current year parameters by score can be produced using the "Graphics" command in the Yearly Compliance Assessment menu. An example of this graphical summary can be found on page A-8.

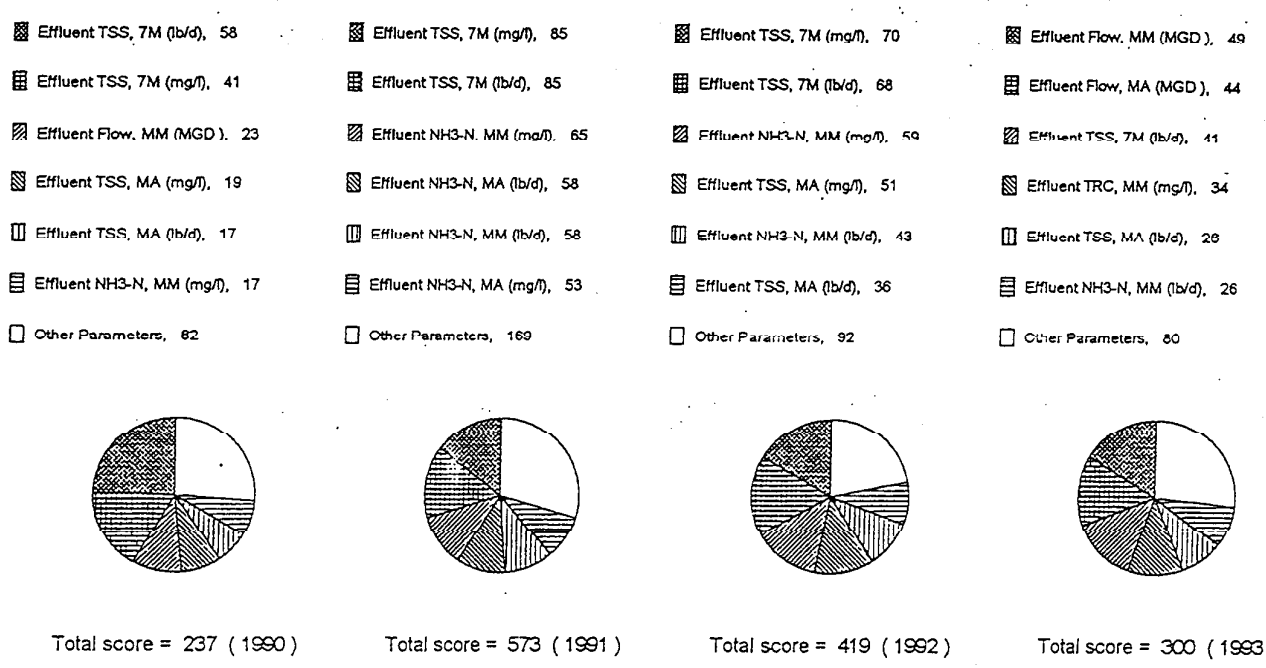
Year to Year Changes in Self Assessment Scores

While a single year evaluation can be instructive in focusing in on specific plant performance issues, the larger benefit of the self assessment process may be realized by looking at plant performance over a longer period of time. An increase in the self assessment score from year to year would indicate an increasing tendency for current and future compliance problems to become more severe.

The self assessment computer program allows the user to automatically compare the changes in self assessment scores over a five year period. Figure 7-1 shows an example of this capability. The user can also generate an annual self assessment report for each year (described above), but the analysis illustrated in Figure 7-1 allows a year to year comparison to be made with all five years data displayed side by side on the same page. For each year of the selected five year period, the violations of effluent limits or design capacities are tabulated in order of decreasing score, and as a pie chart. A bar graph is also displayed showing the annual self assessment score and color rating for each year of the five year period.

The multiple year assessment is completed starting at the Yearly Compliance application window. Clicking the "Graphics" option button, and the program will prompt the user to specify a current year or five year analysis. The years used for the analysis will begin with the current year displayed in the "Year" data cell at the top of the application window. The remaining four years of data will be the first four consecutive years previous to the current year. If there are less than four years of previous data, the program will only use what is available. The multiple year report can be printed by selecting the appropriate option after clicking the "Print" button.

Sim City 1
1990 - 1994

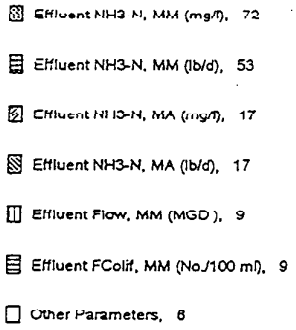


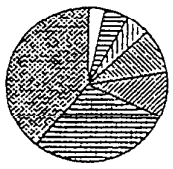
Total score = 237 (1990)

Total score = 573 (1991)

Total score = 419 (1992)

Total score = 300 (1993)





Total score = 183 (1994)

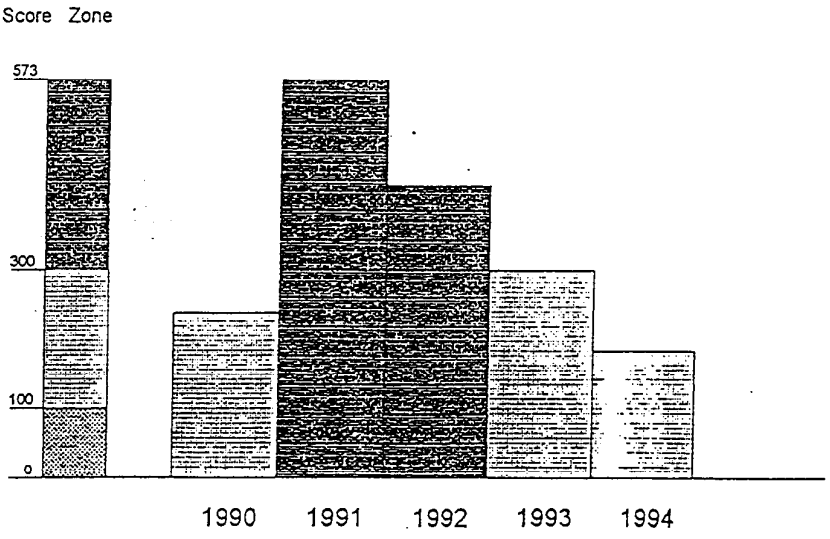


Figure 7-1 Example of five year summary for self assessment scores